T E C H N I C A L M E M O R A N D U M

Utah Coal Regulatory Program

February 20, 2004

TO: Internal File

FROM: James D. Smith, Environmental Scientist and Team Lead

RE: Phase I Bond Release, Pacificorp, Cottonwood/Wilberg Mine, Permit # C/015/0019, Task # 1033

SUMMARY:

A Phase I bond-release inspection (R645-301-880.210) of the Cottonwood Fan Portal in Cottonwood Canyon was conducted on April 2, 2002 (field visit report dated April 9, 2002). Representatives from DOGM, Energy West, the Real Estate Division of The Church of Jesus Christ of Latter-day Saints (LDS Church), and the BLM participated in the inspection. The USFS and OSM were invited to participate in the inspection but no one from either organization attended. At the time of the bond release inspection, Hal Gardner - the representative of the landowner, the LDS Church - gave verbal concurrence.

Drainage control at the Cottonwood Fan Portal was found not to be in accordance with the approved reclamation plan (R645-301-880.310 and R645-301-761). The Permittee was asked to modify the Reclamation Plan to describe reclamation of undisturbed drainage collection ditch UD-3, so that UD-3 would not remain above the site. Damage from erosion at the south end of UD-3 was to be repaired (R645-301-742.311): the filling and grading portion of this repair was done on August 5, 2002, using hand labor and a helicopter to transport materials from a staging area in Cottonwood Canyon. Amendments to the MRP submitted by the Permittee on August 28, 2002 and January 23, 2003 have addressed the concerns from the bond release inspection. The Division's final TA was dated April 1, 2003.

Notice of the application for Phase I bond release was published in the *Emery County Progress* on April 15, 22, and 29 and May 4, 2003. The Division received no public comments about the bond release. The BLM concurred with Phase I bond release in a letter dated October 10, 2003.

Joe Helfrich of DOGM and Guy Davis of Energy West accompanied Henry Austin of OSM when he conducted an oversight inspection of the Cottonwood/Wilberg Mine on December 16, 2003. After the inspection, Mr. Austin indicated that before OSM could concur with the Phase I bond release at the Cottonwood Fan Portal, the Permittee would need to justify the removal of the two sedimentation ponds or basins, which was done in July 2002. In discussions with Mr. Austin, the Permittee, and the Division, it was determined that RUSLE would be used to model the area for sediment loss and the Permittee would add the 2002 vegetation monitoring report (which compares the reclaimed area with adjacent reference area) to the MRP.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

GENERAL REQUIREMENTS

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, -301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764, -301-830.

Analysis:

Sedimentation modeling program RUSLE 1.6 has been used to support the July 2003 removal of two sedimentation basins at the Cottonwood Fan Portal. This information is detailed in a new Appendix B to the Hydrology section. In addition, data from a 2002 vegetation study have been added as Appendix I in the Biology section.

One sentence has been removed and two added under section 762.100 on page 25 to clarify the status of ditches UD-3 and DD-4.

Findings:

This information is considered adequate in regard to the Coal Mining Rules.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Analysis:

Hydrologic Reclamation Plan

RUSLE Calculations of Soil Loss and Sediment Yield

Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on Mined Lands, Construction Sites, and Reclaimed Lands state:

> RUSLE estimates soil loss from a hillslope caused by raindrop impact and overland flow (collectively referred to as "interrill" erosion), plus rill erosion. It does not estimate gully or stream-channel erosion.
>
> … The Revised Universal Soil Loss Equation (RUSLE, Renard et al., 1997) is a technology for estimating soil loss from most undisturbed lands experiencing overland flow, from lands undergoing disturbance, and from newly or established reclaimed lands. RUSLE also may be used as a part of the procedures to prepare permit applications and to assess reclamation success in support of bond release.

The two basic RUSLE equations are:

R*K*LS*C*P = A (estimated annual soil loss in tons/acre)

R*K*LS*C*SDR = SY (estimated annual sediment yield in tons/acre)

- R = erosivity factor
- K = soil erodibility factor
- LS = slope length and steepness factors
- C = cover-management factor
- P = support practices factor
- SDR = Sediment delivery ratio

Estimated annual soil loss (A) accounts for erosion, that is - the amount of sediment loosened by rain and transported by interrill flow plus rill erosion. The estimate of annual sediment yield (SY) takes into consideration factors that cause redeposition of the sediment within the site so that it is not transported down-slope to a receiving stream or otherwise causing off-site impacts.

The calculations of R, K, LS, C, P, and SDR in RUSLE are dependent on numerous other input parameters. Hydrology Appendix B includes a 3.5" computer disc with version 1.06 of RUSLE and the files containing the input parameters used to determine soil loss and sediment yield for the undisturbed slopes at Des-Bee-Dove and reclaimed slopes at the Cottonwood Fan Portal. Table TA-1 below, which shows the same information as the table on Drawing KS-1881D in the amendment, lists the values for R, K, LS, C, P, SDR, A, and SY calculated by RUSLE for the Cottonwood Fan Portal disturbed areas and the Des-Bee-Dove undisturbed areas.

(Values in Table 1 on page 4 of Appendix B and those in the table on Drawing KS-1881D do not always coincide. Also, the estimated K for the reclaimed area is 0.307 according to page 3 of Appendix B, which does not match the values in Table 1 but is rather the average of the values on KS-1881D; similarly, on page 3 the K-value for the undisturbed area is given as 0.21, which again does not match Table 1 or KS-1881D. When RUSLE is run and the parameters are displayed on the RUSLE Soil Loss Prediction Table, values for the parameters are truncated, typically to two decimal places, unless the value is highlighted by the cursor: when highlighted by the cursor, additional digits may appear. The discrepancies between the numbers in Table 1, the text on page 3, and the table on Drawing KS-1881D appear due to the Permittee having sometimes used the truncated numbers and at other times the non-truncated numbers. This is potentially confusing and the Permittee should take care to avoid this in the future, but this does not affect the outcome of the RUSLE calculations or the conclusions based on the calculations.)

Table TA-1

LOCATION	50+00	52+00	54+00	DBDA11U	DBDA12U	DBDA13U	DBDA21U	DBDA22U	DBDA23U
R	10	10	10	10	10	10	10	10	10
K	0.32	0.32	0.28	0.20	0.20	0.20	0.20	0.20	0.20
LS	19.4	21.3	23.5	14.5	16.2	14.3	13.3	7.71	16.3
C	0.04	0.03	0.03	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
P	0.08	0.08	0.08	1.00	1.00	1.00	1.00	1.00	1.00
SDR	0.01	0.01	0.01	1.00	1.00	1.00	1.00	1.00	1.00
A	0.19	0.21	0.2	0.05	0.05	0.05	0.05	0.03	0.05
SY	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.03	0.05

The estimated R-value of 10 for the area is based on maps prepared by the NCRS. The related storm erosivity information (EI), which can be used in RUSLE to calculate seasonal variations in K, C, and P, is based on 16 years of meteorological data (1976 – 1992) from Hiawatha, which has altitude, temperature, exposure, and other factors that are similar to those at

Deer Creek, Des-Bee-Dove, and Cottonwood/Wilberg Mines. (The Hiawatha climate station is not in the standard CITY database that comes with RUSLE but was added by the Permittee as #44399 in the CITY database on the 3.5" disc submitted with this amendment.)

The estimated K-factor for the Des-Bee-Dove undisturbed areas of 0.206 was based on characteristics of the Kenilworth series (KeE2) of the Soil Survey of the Carbon-Emery Area. Values of K for the Cottonwood Fan Portal area are based on soil analyses done in 1997. The silt plus very-fine sand fraction was 55% for the Cottonwood Fan Portal profiles and 39.7% for Des-Bee-Dove; clay was 17% to 18% at the Cottonwood Fan Portal and 15% for Des-Bee-Dove; and organic matter was 2.6 for all profiles.

Drawing KS-1881D shows the locations, hillslope lengths, and gradients that were used in determining LS for the three profiles 50+00, 52+00, and 54+00 at the Cottonwood Fan Portal. Profiles 52+00 and 54+00 are divided into two segments with different gradients. Gradients range from 47% to 81.25%. The Des-Bee-Dove profiles have uniform gradients of 54% to 92%.

Calculations for C for the undisturbed profiles at Des-Bee-Dove are based on a cold-desert shrub plant community and cover management information for undisturbed areas at the Deer Creek Mine (Volume 1, Part2 of the Deer Creek Mine MRP). Calculations for C at Cottonwood Fan Portal are based on values from the 2002 vegetation survey by Mt. Nebo Scientific (Appendix I).

A value of 1 was calculated for both P and SDR for the undisturbed areas at Des-Bee-Dove because no control practices were used to modify or reduce the amount of runoff: this also results in A and SY being equal. Support practices used at the Cottonwood Fan Portal - pocking, mulching, and tacking – greatly reduce the support practices factor and the sediment delivery ratio, to 0.08 and 0.01 respectively. These values are of the same magnitude as those calculated for reclaimed areas at Deer Creek and Des-Bee-Dove.

Calculated Soil Loss and Sediment Yields for the Cottonwood Fan Portal area are compared to RUSLE values obtained for six undisturbed profiles at the Des-Bee-Dove Mine. Although soil loss, or sediment formation, is estimated to be roughly ten times that at Des-Bee-Dove, the sediment yield is comparable, indicating there will be no contributions of additional sediment additional contributions of suspended solids to streamflow outside the permit area.

	Calculated Soil Loss (A) tons/acre/year	Calculated Sediment Yield (SY) tons/acre/year
Des-Bee-Dove – undisturbed	0.03 to 0.05	0.03 to 0.05
Cottonwood Fan Portal - reclaimed	0.2	0.02

Findings:

The Hydrologic Reclamation plan is adequate to meet the requirements of the Coal Mining Rules for Phase I bond release.

REVEGETATION

Regulatory Reference: 30 CFR Sec. 785.18, 817.111, 817.113, 817.114, 817.116; R645-301-244, -301-353, -301-354, -301-355, -301-356, -302-280, -302-281, -302-282, -302-283, -302-284.

Analysis:

In reviewing the Division's recommendation of Phase I bond release at the Cottonwood Fan Portal, OSM requested that current vegetation information be included in the MRP. Data from the 2002 Cottonwood Canyon vegetation monitoring done by Patrick D. Collins of Mt. Nebo Scientific have been submitted as Appendix I to the Biology section of the Cottonwood Fan Portal reclamation plan. The data compare the 1998 reclaimed area against the reference area. No conclusion or finding based on the data is included.

Findings:

The data satisfy the request of OSM for additional, current vegetation data for the Cottonwood Fan Portal and are considered adequate in regard to the Coal Mining Rules.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-323, -301-512, -301-521, -301-542, -301-632, -301-731.

Analysis:

The locations of the three RUSLE profiles are shown on Drawing KS-1881D in Appendix B. This drawing is certified.

Findings:

Maps, plans, and cross sections submitted with this amendment meet the requirements of the Coal Mining Rules.

RECOMMENDATIONS:

The proposed amendment should be approved for incorporation into the MRP.

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